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REMARKS BY R. D. CARMICHAEL, Indiana University.

If the conjecture stated in this problem is true it is highly desirable to have a proof of it. It would be a significant contribution to the theory of prime numbers; for the theorem so obtained would afford a means of recursion by which a sequence of indefinitely increasing prime numbers could be written out consecutively. No such tool has yet been invented. Euler and Legendre sought in vain for analytical expressions which would serve just this purpose. Fermat believed, though he confessed that he was unable to prove, that he had found such an analytical expression in

$$2^{2n} + 1.$$

Euler pointed out the error of this opinion by showing that 641 is a factor of this number for the case $n = 5$.

From these historical facts one is led to suppose that the proof of the conjecture of this problem is probably difficult, in case the conjecture is true; if the conjecture is false, that would be shown by means of an example. The numbers to be dealt with, however, are so large that the construction of such an example (in case it exists) would perhaps be very tedious.

Note. A number of incorrect solutions of problem 198 have been received. Will our contributors please give it a more careful consideration? It is very probably not easy to solve.

EDITORS.

199. Proposed by R. P. LOCHNER, Philadelphia, Pa.

Find three integral squares, such that the sum of every two of them shall be a square.—Alsop's Algebra, 3d edition (Philadelphia, 1859), p. 296, Ex. 13.

SOLUTION BY ARTEMAS MARTIN, Washington, D. C.

Let x^2, y^2 and z^2 be the required squares; then we must have

$$x^2 + y^2 = \square,\ x^2 + z^2 = \square,\ y^2 + z^2 = \square, \tag{1, 2, 3}$$

Assume $y = \dfrac{(m^2 - n^2)x}{2mn}$, $z = \dfrac{(p^2 - n^2)x}{2pn}$; then (1) and (2) are satisfied and (3) becomes, after striking out common square factors,

$$p^2(m^2 - n^2)^2 + m^2(p^2 - n^2)^2 = \square, \tag{4}$$

which may be otherwise written

$$m^2p^2(m^2 + p^2) - 4m^2n^2p^2 + n^4(m^2 + p^2) = \square; \tag{5}$$

and (5) will be a square when

$$m^2 + p^2 = 4n^2. \tag{6}$$

Put $m = \dfrac{2n(r^2 - s^2)}{r^2 + s^2}$, $p = \dfrac{4nrs}{r^2 + s^2}$; then (6) is satisfied. Take $r = 2$, $s = 1$, and we have $m = \dfrac{6n}{5}$, $p = \dfrac{8n}{5}$; $y = \dfrac{11x}{60}$, $z = \dfrac{39x}{80}$. Now take $x = 240$ and we have $y = 44$, $z = 117$, the least numbers known.

The numbers given by Alsop (528, 5796, 6325) are much larger, and same as found by Bonnycastle in his Introduction to Algebra published in London more than 100 years ago.

For other solutions, see *Mathematical Magazine*, Vol. II, No. 11 (Dec., 1898), pp. 214–16; also, the *Normal Monthly*, Vol. III, No. 10 (Millersville, Pa., June, 1876), p. 119.

Also solved by C. E. Githens.

MISCELLANEOUS QUESTIONS.

Edited by R. D. Carmichael.

QUESTION.

11. In our courses of study is it desirable to give more consideration to vector analysis? What topics should be included in a first treatment of this subject?

REPLY.

6. In what ways and to what extent will the teaching of mathematics and the content of the curriculum probably be affected by the increasing demand for vocational training?

I. Remarks by W. T. Stratton, Kansas State Agricultural College, Manhattan, Kansas.

There is a demand today for the practical in education. Every subject that is to remain in our curriculum must do so by showing that it has a real place in the lives of the people. The demand for vocational training will affect both the teaching of mathematics and the content of the curriculum to a very marked degree.

Every new teacher in our high schools has a tendency to teach the topics that were taught to him, and in the same way as he was instructed. Only the unusual man will break away from this practice. So the change in teaching and the vocational attitude toward the subject must find a place in the colleges and universities before they will permeate into all the schools. As long as the former turn out men and women grounded in the belief that the chief reason for the study of mathematics is in its disciplinary value for the intellect the high schools will in general follow the old traditional course. The change in teaching, it seems to me, will come principally from a change of attitude of the teachers toward the subject. The teachers will come to look upon the subject from the social point of view, that is, they will not only teach the mathematical computations and methods of argumentation, but they will also give the subject a social setting; they will show to the students the place in society at which the particular topic under consideration has its direct applications.

The kind of training college men and women have had in the past has not fitted them for work in the vocational schools. Until the normal schools and colleges give vocational subjects, and train the teachers from the vocational point of view, nothing but poorly taught vocational mathematics can be expected in the high schools. I do not mean that the class room instruction will be essentially changed, but that there will be a closer correlation of the mathematics